

Claims

1. A transmission having a plurality of gear ratios, selector means for selectively engaging the gear ratios, clutch means for selectively transmitting drive from a drive source to the transmission, and a control system for controlling a clutch torque limit, said control system being constructed and arranged to automatically adjust the clutch torque limit value before the selector means selects an unengaged gear ratio, to allow relative rotational movement between input and output sides of the clutch if the torque exceeds the predetermined value when the unengaged gear ratio is engaged by the selector means.
2. A transmission according to claim 1, including a sensor arranged to detect the operational status of the clutch means and an actuator for controlling the clutch torque limit, such that, in use, the actuator reduces clutch torque limit until the sensor detects a predetermined operational status before selecting an unengaged gear ratio.
3. A transmission according to claim 1 or 2, wherein the clutch means is arranged to increase the clutch torque limit when the new gear ratio has been selected.
4. A transmission according to any one of the preceding claims, wherein control system is arranged to reduce the clutch torque limit until the input and output sides of the clutch slip before the selector means selects an unengaged gear ratio.
5. A transmission according to claim 4, including sensor means arranged to detect slip between the input and output sides of the clutch, and wherein the actuator for controlling the clutch torque limit reduces the clutch torque limit until the sensor means detects slip between the input and output sides of the clutch before selecting an unengaged gear ratio.
6. A transmission according to claim 4 or 5, wherein the clutch means is arranged to increase the clutch torque limit when the new gear ratio has been selected.
7. A transmission according to any one of the preceding claims, including means for controlling the speed and torque of the drive source.

8. A transmission according to claim 7, wherein the means for controlling the speed and torque of the drive source is an engine control unit arranged to adjust engine output when the selector assembly engages the new gear ratio.
9. A transmission according to claim 7 or 8, wherein the means for controlling the speed and torque of the drive source is arranged to increase or decrease the speed and torque of the drive source to control output torque of the transmission when a new gear ratio is selected.
10. A transmission according to any one of the preceding claims, including means for sensing the position of the selector means within the transmission.
11. A transmission according to any one of the preceding claims, including means for sensing the relative rotational positions of a gear wheel and the selector means and means for controlling engagement of the gear wheel by the selector means according to the sensed rotational positions.
12. A transmission according to any one of the preceding claims, wherein the clutch means is one of a clutch, a torque converter, or a torque converter in combination with a clutch.
13. A transmission according to any one of the preceding claims, including means for measuring or estimating and recording the torque in the transmission before an unengaged gear ratio is selected and means for estimating the torque in the transmission after the new gear ratio has been selected.
14. A transmission according to any one of the preceding claims, including means to predict a target torque at the completion of the shift control sequence and approach that torque level at a predetermined gradient until the target torque is met and the clutch and throttle conditions are reset to the conditions prior to the instigation of the shift.
15. A transmission according to any one of the preceding claims, wherein the clutch is restored to the condition prior to instigation of the shift before the final target torque is met and the throttle control alone is used to reach the target torque from that time on.
16. A transmission according to any one of the preceding claims, wherein the control system includes means for measuring deformation caused by torque in the transmission in at least one static component or assembly that is deformed due to torque in the transmission, and means for controlling the torque in the transmission, wherein the control system is arranged to measure

deformation and to adjust the torque in the transmission according to the measured deformation and a known relationship between the gear ratios.

17. A transmission according to claim 16, wherein the known relationship is substantially linear and values corresponding to the measured deformation are adjusted by a scaling factor.
18. A transmission according to claim 16 or 17, wherein the control system is arranged to control the rate of change of torque in the transmission in accordance with the deformation measured.
19. A transmission according to any one of claims 16 to 18, wherein the means for controlling torque in the transmission includes clutch means.
20. A transmission according to any one of claims 16 to 19, wherein the means for controlling torque in the transmission includes means for controlling the speed of a drive source.
21. A transmission according to any one of claims 16 to 20, wherein the control system includes means for calculating the magnitude of torque in the transmission system.
22. A transmission according to any one of claims 16 to 21, wherein the means for measuring deformation includes at least one load cell, and preferably a plurality of load cells.
23. A transmission according to any one of claims 16 to 22, wherein the means for measuring deformation includes at least one strain gauge.